of the chemical elements is of primary importance in the proper study of celestial spectra, and Dr. Lohse's record will be very useful in that connection. It seems to us, however, that his work would have been greatly enhanced in value if he had confined his attention to the same region of spectrum for each metal, and had included the portion from λ 400 to λ 486 (F), say, especially as that is the region of stellar spectra most ordinarily investigated.

INDEXES to the literature of gallium (1874–1903) and germanium (1886–1903), prepared by Dr. P. E. Browning, have been issued as parts of vol. xlvi. of the Smithsonian *Collections*.

THE general occurrence of radium in association with uranium has formed an important argument in connection with current views relative to the formation of radium. In a recent note M. Danne states that certain plumbiferous earths in the neighbourhood of Issy-l'Évêque contain radium, but are completely free from uranium. Certain facts seem, however, to indicate that the radium has made its appearance in the pyromorphite at a comparatively recent date through the medium of radio-active water from springs in the neighbourhood.

THE International Committee on Atomic Weights has issued its annual report and a table of numbers for use during 1905. On the basis of new determinations, changes are recommended in the atomic weights of indium, iodine, rubidium, and samarium. As the result of several independent investigations on the atomic weight of iodine, there can now be no reasonable doubt that the value 126·85 given by Stas is too low, and 126·97 is adopted in the new table. The atomic weight of nitrogen would also appear to be much closer to the round number than is represented by the value 14·04 at present in use, and further investigations of this element are needed.

AN interesting paper on the production of calcium cyanamide and its employment in agriculture as fertiliser was recently read by Prof. Frank before the "Klub der Landwirte" in Berlin. As manufactured at present, 250 kilograms of atmospheric nitrogen can be obtained per year in the form of calcium cyanamide for each electric horse-power. The efficiency of the substance as fertiliser has been established by experiments at a large number of agricultural stations, and the combined nitrogen is stated to be as effective as an equal quantity in the form of ammonium sulphate or Chili saltpetre.

THE much discussed question as to the nature of the hydrosulphites has been subjected to further experimental investigation by Messrs. Baumann, Thesmar, and Frossard, and an account of these experiments is given in the *Revue générale des Matières colorantes*, vol. viii., p. 353. The view of Schützenberger that hydrosulphurous acid is to be represented by the formula H_2SO_2 receives strong confirmation. As is pointed out, the crystalline sodium salt $Na_2S_2O_4.2H_2O$ obtained by Bernthsen may be written $NaHSO_2 \cdot NaHSO_3 \cdot H_2O$, and the behaviour of the mother liquors, from which this salt separates, corresponds with this view. In fact, two formaldehyde compounds corresponding to $NaHSO_2.CH_2O.2H_2O$ and $NaHSO_3.CH_2O.H_2O$ have been separated and analysed.

A NEW booklet has been added by Messrs. Dawbarn and Ward, Ltd., to their "Country House" series of practical handbooks. It is by Mr. D. Grant McIver, and is entitled "Pruning, Training, and Trimming Trees and Shrubs."

MR. JOHN MURRAY has published an attractive English edition of Prof. W. H. Pickering's work on "The Moon," the American edition of which was reviewed in NATURE of May 5, 1904. The work contains a summary of the existing knowledge of our satellite, and the statement of Prof. Pickering's observations and arguments in favour of lunar activities, illustrated with a complete photographic atlas of the moon. The price is two guineas net.

THE second volume of "Papers of the British School at Rome" has been published by Messrs. Macmillan and Co., Ltd. The volume is by Mr. T. Ashby, jun., and is concerned with sixteenth-century drawings of Roman buildings attributed to Andreas Coner. The drawings are preserved in Sir John Soane's Museum at Lincoln's Inn Fields, London. The contents of the sketch-book in which the original drawings are preserved include ground plans, plans and elevations of tombs, elevations, architectural details, Doric entablatures, Ionic and Corinthian entablatures, plain mouldings (cornices and plinths), Doric capitals, and plain and ornate bases. The reproductions of these sixteenth-century drawings which are now available will be of great service for the purposes of study and criticism.

OUR ASTRONOMICAL COLUMN.

EPHEMERIS FOR BROOKS'S COMET, 1904 I.—On a photograph obtained at Greenwich in January the image of Brooks's comet (1904 I.) was quite strong, and indicated that the object was, probably, not fainter than the eleventh magnitude. The following is an ephemeris for this object as given in No. 354 of the *Observatory*.

Ephemeris 12h. M.T. Greenwich.

1905	R.A. h. m. s.	Dec. ° ′
Feb. 17	9 55 56	+64 37
,, 23	9 34 55	+64 25
Mar. 1	9 15 34	+63 55
,, 7	8 58 27	+63 11

This ephemeris required corrections of −5s. and −0′.8 on December 7, and shows that the comet is travelling in a westerly direction through the constellation Ursa Major. On March 7 it will be very near to, but S.W. of, τ Ursæ Majoris.

OBSERVATIONS OF COMETS.—A number of photographic and visual observations of Encke's comet were made by M. Quenisset at Nanterre during December. The photographs obtained show that the comet gradually became brighter during the period covered by the observations, and that the coma was extensive and fan-shaped, its extension being in a W.S.W. direction, *i.e.* turned away from the sun. On the photographs this coma was about 4′ in diameter and contained a nucleus which was not at the centre. Visual observations made on December 7 showed the fan-shaped coma to be 5′ or 6′ in diameter with the nucleus situated near to its E.N.E. edge and having a position angle of about 70°, reckoned from the centre of the coma. On this date the comet was at the limit of naked-eye visibility, its estimated stellar magnitude being about 6.5.

Borrelly's comet (1904 *e*) was also observed, photographically and visually, on January 1 and 2 by M. Quenisset, and was seen as a faint nebulosity of 1′.5 to 2′ diameter with ill-defined boundaries. A very faint nucleus of magnitude 11.5 occupied the centre of the coma, and the photograph obtained on January 2 showed a faint tail extending in an E.S.E. direction (*Bulletin de la Société astronomique de France*, February).

ADDITIONAL PERIODICAL COMETS DUE THIS YEAR.—In addition to those periodical comets previously mentioned by Mr. W. T. Lynn as being due at perihelion this year, Mr. Denning, writing to the *Observatory*, mentions Tempel's 1867 comet, which should pass through its perihelion point in April. This object has suffered considerable perturbations from Jupiter, which have lengthened its period from 5.982 to 6.539 years, and have changed its perihelion distance from

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1.56 to 2.07. The comet was re-observed on its return in 1873 and in 1879, but has not been seen since.

Wolf's 1884 comet is also due at perihelion in April, but the conditions for its observation will be very unfavourable.

Another comet which may return towards the end of this year is the faint one discovered by Prof. Barnard in 1892. It was not seen, however, in 1899, and, as its exact period is doubtful, although probably about 6½ years, it may again escape detection.

CASTOR A QUADRUPLE STAR.—In a communication to the Astronomical Society of the Pacific (*Publication* No. 99) Prof. Campbell discusses the multiple character of Castor, and states that Dr. Curtis, using the Mills spectrograph attached to the 36-inch refractor of the Lick Observatory, recently discovered that the brighter component of the system is attended by a faint companion. The fainter component was shown by M. Belopolsky, in 1896, to be similarly double, so that in Castor we have a quadruple system in which each component of a visual double is attended by a faint companion. The period of the fainter system is about three days, but further observations of the brighter double will have to be made before its period can be determined.—(*Popular Astronomy*, No. 2, vol. xiii.)

BLOOD PRESSURES IN MAN.[1]

THE lecturer began by contrasting Galen's conception of the oscillation of the blood, about the liver as a centre, with the cardiac circulation of Harvey. The pulmonary circulation—for the purposes of this lecture—was omitted, and attention directed exclusively to that in the systemic arteries.

The physical characters of the flow of fluids were briefly described by the example of water in an open stream. A stream might well up from a spring in a flat country, and swim with very low pressure to its mouth; or, falling from a mountain, might have pressure enough to carry men and horses off their legs. If the volume were also great, as in the sea, it might exercise a pressure of many tons to the square yard, and smash great bulwarks to pieces. But in the higher animals the blood flows in closed channels, so that in such a scheme as theirs the dimensions of the channels assume a very important value. Moreover, in mammalia the circulating fluid is not water, but a thicker fluid—the blood—which (in man) has at least four times the viscosity of water. The enormous value of friction in the circulation was then considered, and it was shown that in this factor the kind of vessel wall does not signify much, as the wall is lined by a practically stationary layer of the fluid; friction, therefore, which uses up 99/100ths of the heart's power, depends on the factor of viscosity together with that of the dimension of the channels, or closed bed. It may be said that the blood pressures—that is, the arterial pressures—in man depend on viscosity and dimension of stream bed.

Now so far the closed tubes had been regarded as rigid. But if in animals the tubes were rigid the circulation would be carried on under great difficulties. For instance, there would be no accommodation; only so much blood could be driven into the system as issued at the periphery; the stream, too, would be quite intermittent, with very high maximum and very low minimum pressures, which would not serve for continuous nutrition, and by its extremes of pressures would soon wear down the arteries. For instance, in the bagpipes, were it not for the air reservoir the sound would issue in spasmodic screams; whereas the air-bag turns the intermittent blowing into a continuous feed of air. In the arterial system of man the same provision is made; its tubing is highly elastic, and a chief part of it—namely, the aorta—being relatively wider than other branches of the tree, contains, like the bagpipe reservoir, accommodation for very variable supplies of output from the heart pump. Thus a very large part of the heart power is used in dilatation of the vessels, and by these is given back to the blood. The valves of the heart serve a like purpose of regulating the pressure of the supply to the vascular system.

The lecturer in the next place dealt with the pulse, contrasting the travel of the wave with the travel of the blood itself. The wave due to the shock of the heart beat travels, ordinarily, about twenty times as fast as a given particle of the blood itself. The tenser the walls of the arteries the faster the wave travels along the taut vessels, but the slower the passage of the blood itself. Herein lies one of the chief evils of a morbid rise of arterial pressure; more stress on the vessels, less distribution of their contents. Many of these processes were illustrated by lantern slides and demonstrations by Dr. Dixon, demonstrator of pharmacology in Cambridge.

After these principles Dr. Dixon exhibited the various instruments in use for measuring blood pressures in man, and the means by which their curves may be recorded on a revolving drum (kymograph).

The lecturer then entered upon the vital properties of the arteries—that they are not only elastic, and so accommodate themselves to the varying pressures, but are endowed also with nervous governance, whereby they effect a large economy in work and material. Several functions of the human body cannot, save within small limits, work together. If we are digesting we are not apt for thought; the Alpine climber is mercifully unable to worry over affairs—his mind is put into abeyance; and so on. Thus the arterial system, by the means of its nervous connections, contracting in some areas and dilating in others, automatically diverts its fertilising streams hither or thither as needs arise. Moreover, it can enlarge or diminish its bed according to the total quantities of blood temporarily in circulation—a quantity which is very variable. By contracting the arteries in considerable areas and correspondingly dilating them in others, the fields of the various functions of the body can be used alternately, as we see in the irrigation of Alpine meadows. By the same means the very various pressures of the blood can be counteracted. When under muscular effort, for instance, the pressure is raised, a corresponding area outside the muscles is dilated, and pressure more or less equalised; thus the heart is enabled to do the most work with the least disturbance of stresses. So in a bath, cold or very hot, the crimping up of the large cutaneous areas is compensated by large dilatations in internal areas, and pressures return to the normal in two or three minutes. The chief area in which blood can be accommodated, and thus for a time put out of circulation, is a large abdominal area.

By these considerations the lecturer was led to explain why the blood in the body does not drop down into our feet and legs, and leave the brain and other vital parts. Indeed, the blood has a strong disposition thus to obey the action of gravitation, and one of the events of approaching death is the falling of the blood into lower parts of the body, deserting the heart and brain. Obviously this is especially the case in upright animals, as in man chiefly, and in apes in some measure. It is by the vigilance of the nervous governance that the blood is held up, by the contraction of the abdominal vascular fields; and it is the failure of these mechanisms which appears as shock, syncope, or collapse. The lecturer, assisted by demonstrations by Dr. Dixon, illustrated these dispositions, citing especially the researches of Prof Leonard Hill on the distribution of the blood in various positions of the body. He also referred to the bearing of these principles on the researches of Prof. Waller and others on the dangers of anæsthetics. By some most interesting experiments by Dr. Cushing he showed how enormously the arterial pressures may be raised in case of danger of failure of supply of blood against gravity when, as in apoplexy or a depressed fracture of the skull, the blood-vessels, in the parts of the brain where all these mechanisms find their centres, are compressed and thus more or less liable to be emptied.

In the last part of the lecture the lecturer apologised for occupying time with so much physiology, in which subject he is not an investigator. But it was necessary to make manifest to his audience how great is the importance of the integrity of the arteries themselves, and of their nervous governance in function, an integrity which is a matter of life and death; for if the circulation fails in the nervous centres or heart, life must cease. Now the arteries are subject to many injurious conditions, as of certain poisons and infec-

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[1] Abstract of a lecture delivered by Prof. T. Clifford Allbutt, F.R.S., at the Royal Institution on February 3.

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